Dr. James Gosz
Chair, LTER Network Coordinating Committee

Dr. Robert Waide
Executive Director, LTER Network Office

Dear Jim and Bob,

Attached please find a copy of our report. We are very enthusiastic about the paths you have taken and the directions in which you are heading, both within the network as well as at the LTER Network Office. We have seen tremendous progress since we met in Albuquerque in June 2003.

Our report reflects our enthusiasm, highlights several of your key accomplishments, and identifies some issues that we feel will benefit your efforts if you explore them further.

Thank you for your hospitality while there.

We hope that the comments in the report are helpful, and we look forward to working with you over this very exciting time. As always, we stand ready to help in any way and are eager to hear more about your plans as they develop.

Sincerely,

Peter Arzberger on behalf of the National Advisory Board:

Paul Risser, Chair, (Oklahoma State)
Peter Arzberger (UCSD)
Roger Bales (UC Merced)
Barbara Bedford (Cornell)
Robert Dickinson (Georgia Institute of Technology)
James Levitt (Harvard University)
John Magnuson (U Wisconsin)

Attached: Report of the LTER National Advisory Board, Meeting 29 May 2005

Final
5 October 2005

Report of the LTER National Advisory Board

Meeting 29 September 2005

The LTER Network Office (LNO) has made very impressive progress since our last full meeting (June 2003) in developing its own strategic plan, and in its concrete steps following the plan to improve effective operations and hence its value to the entire LTER Network.

The separate LTER Network planning effort impressed us as remarkably good in its intellectual richness, an innovative conceptual framework, and broad community involvement. We expect that the guidance provided by this planning effort will contribute to a fundamental shift in ecological research. We believe that its visionary directions would not have been possible without NSF's willingness to encourage the "network level research" envisioned by the plan, through its support for the planning grant itself, and through its acceptance of the intellectual and financial framework that network level research must build on top of the site-based science which is the bedrock of the LTER program.

Finally, we want to acknowledge that the LNO's personnel and others in the LTER network appear to be working together well. In the implementation of the LTER Network Planning Activity, and in constructively partnering with AIBS to create and present materials to Congressional staffers at the recent briefing "Translating Science for Society" for Capitol Hill staffers on 13 September 2005, the LTER Network and LNO showed constructive interaction. This new outreach component to present LTER accomplishments is very welcomed and strongly encouraged.

The remainder of this report covers three topics in greater depth: LNO Strategic Plan; LTER Network Planning Activities and activities over the last two years; and composition of the National Advisory Board (NAB) and frequency of its meetings.

We strongly endorse the steps that are being taken by the network and by LNO, and stand willing to help whenever appropriate.

LNO Strategic Plan and Accomplishments from 2003 to 2005

During the course of the last two years, the LTER Network Office (LNO) has expended a great deal of effort to develop a strategic plan for its operations. The effort had to balance the realities of interfacing with many part of the scientific community, including the LTER Network, the ecological community, NSF, and the administration of the University of New Mexico.

The NAB is very impressed with the plan, its thoughtfulness, and attention to detail. We feel that this planning process has and will continue to serve the LNO and the LTER Network well. We believe that systematic processes are now in place that will lead to

effective management and clearer accountability of the LNO to the LTER community, and to NSF. These processes include systems for setting priorities within the LNO for support of LTER Network sites and for evaluating LNO staff and activities.

Over the course of the last two years, the LNO has been guided by this plan to successfully complete many other measures, with the support of NSF. These include, among many others:

- Design and implementation of a process of assessment and evaluation of activities;
- Development of an LNO information technology and information management plan;
- Development of clearly define scope of work.

We wish to highlight two specific activities that illustrate the value-added component of a Network Office that is able to become broadly involved in strategic network level activities. The first activity, completed in cooperation with the American Institute of Biological Sciences (AIBS), is the effort to better inform Congress of the science being done by the LTER program and its relevance to current issues facing the Nation. The work included a briefing session on the Hill (13 September 2005), and the publication of a brochure on *Translating Science for Society* that was distributed at that meeting. The second activity was facilitation by the LNO of the proposal to NSF to support the LTER Network Planning activity. The NAB wants to express its support for this type of functioning of the LNO, and congratulate all involved for a very successful set of efforts.

With the knowledge that some of the following issues are already being considered, we would like to encourage the LNO and NSF to continue to think through the following:

- How can the LNO facilitate similar synthetic, network-wide efforts in the future?
- How can the LNO work synthetically, across the network to support exciting science?
- Given the strides already made to improve the responsiveness and accountability of the LNO, how can the LNO, NSF and other relevant entities streamline the routine LNO reporting and review processes, to free up the LNO to devote more effort to furthering the development of synthetic, cross-network initiatives?

The University of New Mexico (UNM) has been very important in its support of the LNO. With help from senior UNM administrators, the LNO has established a new administrative structure, called the Center for Research on Environmental Science and Technology (CREST), within the UNM system. As an administrative unit within the UNM system, CREST has been able to foster better interaction of the LNO with other UNM campus units, a stronger voice for the LNO at the Dean's level, and a sharing of administrative resources. UNM has been particularly helpful to the LNO in other important ways. For example, UNM helped pay for a state-of-the-art-training room for information technology that will be a valuable asset for the LNO and the LTER Network. Furthermore, UNM is committed to obtaining funds for a video teleconferencing (VTC)

system with a multipoint conferencing unit (MCU) that would be an additional important asset for the LTER community. The MCU, for example, could be used to host remotely-attended videoconferences for one or several simultaneous working groups on a given day, helping to reduce travel costs and improve efficiency.

The NAB wishes to acknowledge these UNM contributions and commitments, and feels the addition of both the training facility and the VTC system will be a major benefit for the LNO and the LTER network.

LTER Network Planning Activity

In June 2003 the NAB heard about the LTER Network's plans to develop a network level science vision. The NAB strongly endorsed the idea. With the facilitation of the LNO, the LTER Network (with Scott Collins acting as the Principal Investigator) submitted a proposal to NSF for a two-year planning activity. An award was made in September 2004.

With that grant, the LTER community has commenced a broad, community based planning effort. The effort has been iterative, soliciting ideas from the bottom up, to create a conceptual framework for a long-term, multi-site research program that seeks to develop an understanding of anthropogenic pulse-press interactions with ecosystems on multiple scales. That is, the research will aim to address the overarching question: "How do changes in human populations and their behavior, climate variation, altered biogeochemical cycles, and biotic structure interact to affect ecosystem structure and function and their services to society?"

We are excited about this initiative for a number of reasons.

- Both in the ten-year review and in the 20-year review of the LTER Network, the review committees encouraged the network to think beyond the site-based foundation of the LTER. The NAB report of 2003 also encouraged this direction. We are pleased that the LTER community has now taken significant steps to realize the potential of this new science.

- The planning activity as explained to us is intellectually rich and socially powerful. We are encouraged and excited by the prospect that a broad ecological / sociological research community would have sustained, multi-year, multi-institutional funding to address issues that cannot be studied (well) under funding models more often associated with NSF funding patterns (e.g., 3-year, single-site funding).

- Given that NSF supported this planning activity, and has been well-informed regarding planning-related deliberations, we are encouraged that NSF may support the framework and proposals to conduct network-based science.

- Furthermore, the material presented to us made clear that the funding for such network-based research would not come from, or at the expense of, the current site-based NSF support. Rather, we believe that NSF sees the need for new funding for such research. We strongly endorse this perspective.

We urge the LTER community to remain broad in this program conceptualization, developing its capacity to work with organizations such as the National Parks, the Organization of Biological Field Stations, a broad set of National Laboratories, and with NEON so as to fully realize the vision of the network-based science. The LTER network is well positioned to lead and catalyze such efforts through the new initiative that is being developed in the planning grant. The LTER community is well poised to take advantage of the potential complimentary between LTER and NEON. Furthermore the LTER network is positioned not only to take advantage of the NEON infrastructure, but also to help shape some of NEON's research agenda. We support such positioning, but we believe that the research program being developed in the planning grant is of great value on its own.

An underlying cyber-infrastructure will be needed for LTER to conduct network-based science. We were intrigued by the plans for such that we heard. We compliment the LTER community for recognizing the need to focus on this topic, and the NSF for funding a cyberinfrastructure planning grant. However, because the leaders of that effort where not able to attend our NAB meeting because of commitments elsewhere, we were not able to learn as much as we would have liked. We consequently request that the LNO arrange in the near future a teleconference that would allow interested NAB members to discuss the cyberinfrastructure plans in greater depth with leaders of that planning activity.

Finally, we encourage several specific actions in implementation of the planning activity.

- Network Experiment: We encourage the planning group to work through characteristics of a "network" research experiment, and how it would work. We believe that such an experiment would benefit from thinking in some depth about implementation, governance, and many other issues such as cyberinfrastructure.

- Implementation Scenarios: We encourage the planning group to look at a variety of funding scenarios, ranging from the most optimistic, to ones that would be more modest and allow for increase funding, or rolled out over a longer-time frame. Such an exercise will expedite the implementation when funds become available.

- Governance: Now is the time to look at a variety of governing structures to support network-based science. We agree with the essence of comments we heard that the current governing structure of LTER may not be sufficient to handle the unique problems of sustained, cross-site research. We heard about a few models, and we want to encourage the governance subcommittee to think

through the strengths and weaknesses of each of a number of models. It is important to do this in parallel to development of the science plans.

National Advisory Board: Composition and Frequency of Meetings

The National Advisory Board (NAB) structure and role are articulated in the current bylaws. The NAB serves both the LTER Network and the LNO. Recognizing the changes that are taking place in the network, the NAB re-examined aspects of the bylaws, including meeting frequency and membership.

Meetings: We recommend that we continue to aim to meet annually, especially during this phase transition to network science. In particular, we would like to meet prior to the All Scientist Meeting (ASM) in September 2006, in time to provide input into the recommendations made during the final stages of the Planning Grant.

We stand ready to assist on a more frequent basis, and suggest that LNO use technologies to facilitate "virtual" meetings (possibly taking advantage of the VTC facility mentioned above). Finally, we feel that some meetings would be better placed at sites other than LNO. This would allow the NAB to meet other LTER personnel, and it would allow other LTER community members to better understand the purpose and workings of the NAB.

Membership: Given the direction of the planning grant activities, we recommend expanding the committee to 10 to 12 people, and to diversify the individuals providing input to the LTER network. Studies have shown that diversity in a committee or team can provide a larger set of ideas to be considered, especially valuable in times of change. Ideally, individuals to be considered for the NAB would be broad thinkers and forward looking. Some areas of expertise for the potential NAB members, in addition to those already represented on the Board include social scientists and those familiar with the frontiers and trends of information technology.

Term of Appointment: The relevant bylaws currently state that "NAB membership will be for 3 years with a replacement of 1/3 of the membership each year." While no final recommendation was made, we noted that specified terms allow for a graceful way to achieve turnover of committee membership. We note the utility of bringing new ideas into the group, as well as retaining (reappointing) some members over time to provide continuity and some form of "institutional memory." Both "new blood" and "institutional memory" were thought to be valuable to a committee trying to provide guidance to the LNO and to the broader LTER community as each undergoes significant changes.